

Mount Rainier National Park

Sister Mountain Project

Volcanic Processes

Overview	A variety of volcanic processes shape landscapes. Students are introduced to volcanic processes and the hazards that may be present for humans near the volcano. A volcano does not have to be active in order for some types of hazards to occur. Volcanic hazards can be categorized into gases, lahars, landslides, lava flows, tsunamis, pyroclastic flows and tephra. Many different volcanic hazards endanger the lives of Japanese and American citizens. After students are able to identify the volcanic processes they then identify which pose hazards locally. Students will prepare a brochure to educate the public on hazards of their local mountain and how to mitigate danger.
Grade Level	6-9
Objectives	<p>Students will:</p> <ul style="list-style-type: none">• Recognize the scope of geologic processes that occur at Cascade volcanoes.• Describe volcanic processes.• Identify a variety of volcano hazards and appropriate responses.• Communicate geologic processes to the public to raise their awareness of potential hazards.
Setting	Classroom, library or computer lab (if students are researching processes)
Timeframe	Two 50 minute periods
Materials	Volcanic hazards video, copies of student handout for creating brochure, material for making brochure (paper, markers, scissors and glue), copies of <i>Living with a Volcano in Your Backyard – Volcanic Processes</i> graphics (optional), digital copy of volcanic Processes Slideshow (optional).
Vocabulary	eruption, hydrothermal alteration, lahar, landslide, lava, magma chamber, magma conduit, pyroclastic flow, volcanic ash, volcanic bombs, volcanic gas, tephra, vent, debris flow, fumerales
Standards	<p><i>Science</i></p> <p>6-8 ES3D Earth has been shaped by many natural catastrophes, including earthquakes, volcanic eruption, glaciers, floods, storms, tsunamis, and the impacts of asteroids.</p> <p>6-8 ES2G Landforms are created by processes that build up structures and processes that break down and carry away material through erosion and weathering.</p> <p><i>Communication</i></p> <p>1.1 - Uses listening and observation skills and strategies to focus attention and interpret</p>

	information.
Background	<p>While the processes of volcanoes can be generalized, described and classified each volcano represents different hazards to humans due to a variety of contributing factors. For example the eruptions, as well as hazards, from the recent volcanic activity in Iceland varied greatly from the eruption of Mt. Pinatubo in the Philippines. While in a computer lab or library, ask students to compare the hazards and risks associated with other natural disasters. As an educator, emphasize how preparedness techniques are similar for the different situations including planning, storing emergency supplies, and being aware of evacuation routes.</p> <p><i>Volcanic Processes</i></p> <p>The term volcanic processes refers to eruptive and non-eruptive activities that take place on volcanoes, such as <i>lava flows, pyroclastic flows, lahars, hydrothermal alteration, landslides</i>. Students viewing photos may get the faulty impression that volcanic events occur in isolation. In reality, volcanic events are usually a combination of processes happening simultaneously or in a stepwise progression.</p> <p><i>Volcanic Hazard Response</i></p> <p>A geohazard is an Earth process that when interacting with human activity could cause loss of life and/or property. The hazard assessment branch of science provides a wide range of jobs and there is a race to find ways to reduce the impacts of these events. Scientists often focus on precursor events as a way to forecast a larger future natural event whether a flood, earthquake, tornado, tsunami, or volcanic eruption.</p> <p>With any natural disaster, preparedness makes a difference between the loss of property and even lives. Many different locations have emergency management plans that are available online for residents, businesses, and city planners. In case of any emergency, awareness of appropriate and timely response is imperative to the individual and the people around them.</p> <p>For additional background information about volcanic processes consult webpages of the US Geological Survey's Volcano Hazards Program, particularly the fact sheet entitled <i>What are volcano hazards?</i> (U.S. Geological Survey Fact Sheet-002-97) and accompanying pdf file <i>Fact Sheet 0027-97 What are Volcano Hazards?</i></p>
Procedure	<p><u>Part 1</u></p> <ol style="list-style-type: none"> 1) Introduce students to volcanic processes. 2) Distribute the volcano processes student page or have students create their own table/chart/note page. Students work to research and write a definitions and

	<p>descriptions of volcanic processes.</p> <p><i>Options in lieu of student research:</i></p> <ol style="list-style-type: none"> View slideshow on volcanic process Watch IAVCEI video <i>Volcanic Hazards</i> Follow prepared lesson <i>Volcanic Processes</i> from <i>Living with a Volcano in your backyard—Mount Rainier USGS Open-File Report 98-519</i> with graphic for student investigation of volcanic processes. <p><u>Part 2</u></p> <ol style="list-style-type: none"> Review volcanic processes. Discuss factors that make processes hazardous. Distribute student handout tasking them to create a brochure that communicates which of the volcanic processes pose hazards at the local mountain.
Suggested Assessment	<ul style="list-style-type: none"> The student handout includes a rubric for scoring the brochure, so it can be used as a summative assessment. The rubric can be modified for course or teacher needs.
Adaptations	<ul style="list-style-type: none"> Provide a handout to students with a chart that has the names of different hazards prefilled on the chart and students can fill in definitions and descriptions for corresponding hazards. Use the USGS lesson plan <i>Living with a Volcano in Your Backyard: Volcanic Processes</i> for students to familiarize themselves with volcanic processes. Students learn the general sequence of volcanic processes by discussion and a quick classroom demonstration. Visually demonstrate this sequence by selecting six student volunteers to represent the volcanic processes noted above. Student volunteers stand in the correct order to represent the following common sequence of events: volcanic ashfall, lava flow, pyroclastic flow, lahar. With students remaining in place, begin a classroom discussion with the questions presented in the activity.
Extensions	<ul style="list-style-type: none"> Using 3D computer illustration software or “movie maker,” students could work in teams create a short film to support or in lieu of their brochure. Depending of file size, the final video could be placed on the school’s homepage as a community awareness effort. Make sure that students cite sound and other visual files at the end of the film like professionals.
References/ Resources	<p>Myers, B., Brantley, S.R., Stauffer, S., and Hendley II, J.W.,1997: What are volcano hazards? U.S. Geological Survey Fact Sheet-002-97, 2p.</p> <p>Driedger, C., and Scott, K., 2002, Mount Rainier--Learning to live with volcanic risk: U.S. Geological Survey Fact Sheet 034-02, 4 p.</p> <p>Driedger, C., Doherty, A., & Dixon, C. (2005) “Volcanic Processes” <u>Living with a volcano in you back yard-an educator’s guide with emphasis on Mt Rainier</u>. General Information Publication 19. Available on-line at</p>

http://vulcan.wr.usgs.gov/Outreach/Publications/GIP19/chapter_two_volcanic_processes.pdf

IUGG, "Volcanoes and Cities." IUGG Commission on Volcanic Risk. unknown. International Union of Geodesy and Geophysics. 1 Aug 2008 <http://iugg-georisk.org/volcano.html>

Washington Emergency Management Division, Group Health Cooperative, and Puget Power, 1996, Family Emergency Preparedness Plan, 25 pages.

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